

# Flow Monitoring

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# *Why* do we monitor wastewater flow?

- Plan wisely for future expansion.
- Direct maintenance and repair.
- Supply modeling projects with vital information .
- Accurately document overflows.
- Help pinpoint I/I sources.
- To understand our system better in general.

## *How do we monitor wastewater flow?*

- Here at WTD we use an array of different sensor technology to measure depth and velocity. With depth and velocity values flow is calculated.
- Permanent Flow Meters (i.e. cso sites)
  - Hydro Ranger (large range) and others
- Temporary and Long-Term Meters
  - Over 100 portable flow meters are currently active

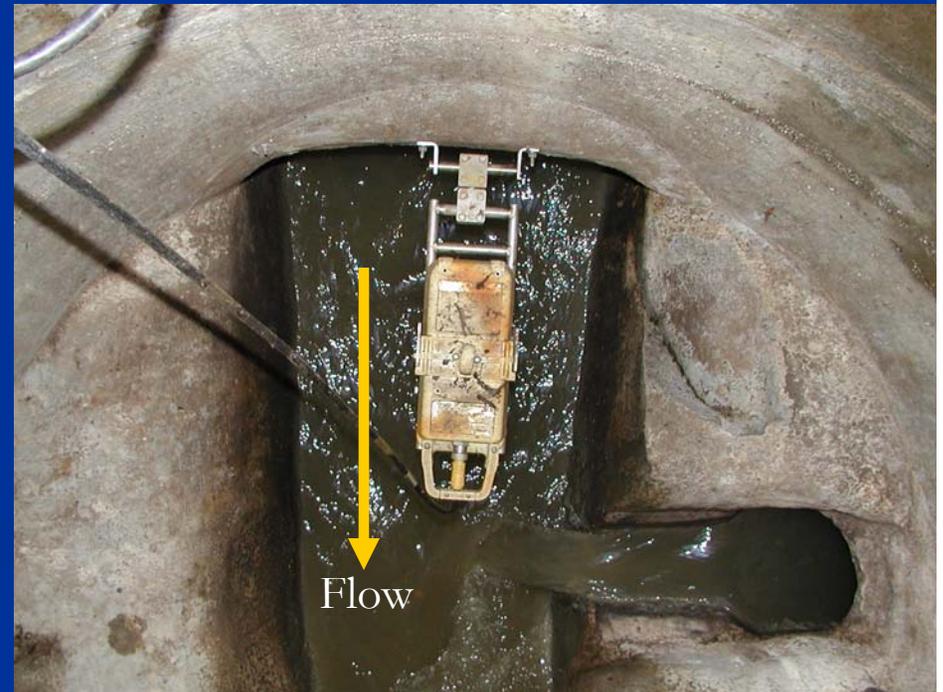
# Portable Flow Meters

- Marsh McBirney
  - Flo-ToteII, Flo-Tote III, and Flo-Dar systems.
  
- ADS
  - 3600/01 and Flow Shark systems.

# Marsh McBirney Flo-Dar System



- Flo-Dar shooting up-stream



- All sensors in one nice package
- \* : Pressure depth sensor kick in during once unit is submerged along with electromagnetic velocity sensor.

# The Nitty Gritty: Installation / Maintenance



- Marsh McBirney Flow Tote III system with tension ring install.
- “Rags” disrupting electromagnetic velocity sensor. Please remove.

- Matt Charles knows that safety is number one when it comes to maintenance.



# The Data Analysis Process

1. Retrieval
2. Review
3. Adjustment
4. Finalization

# Data Review

- Depth and Velocity
- Site Visit Log, Rain Events, and Photo Library
- Setup Changes

# Depth and Velocity

- Is the data continuous and as it “should” be?
- Do they match up? If not, does it still make sense (is it real data)?
- Is there a diurnal pattern? Is there a seasonal pattern?
- Does the average range of the data change?



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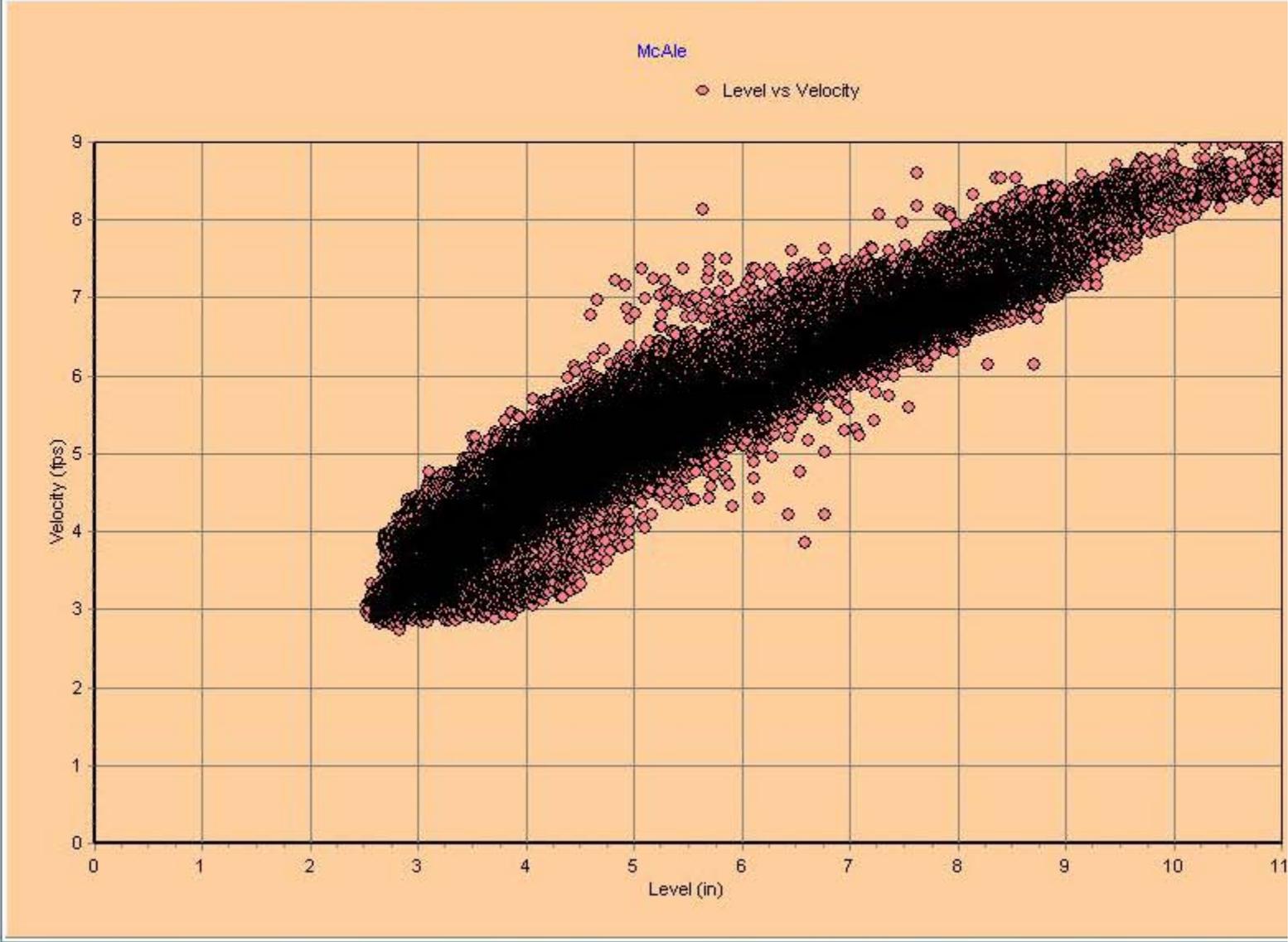
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1/2004 10:56 AM  
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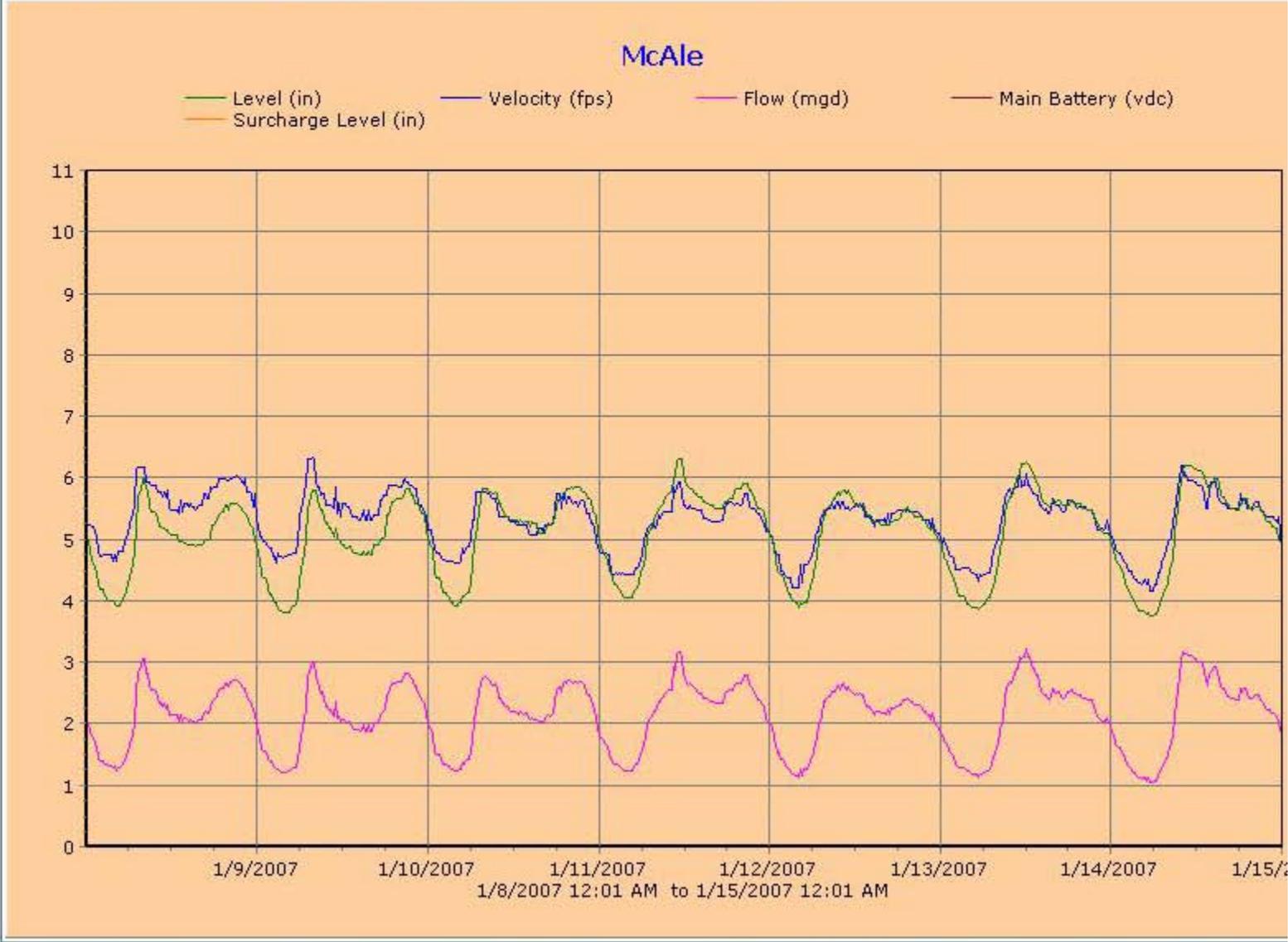
- [Level \(in\)](#)
- [Velocity \(fps\)](#)
- [Flow \(mgd\)](#)
- [Main Battery \(vdc\)](#)
- [Surcharge Level \(in\)](#)



Navigation menu:

- Home
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- Report Settings
  - Project Data Span
    - 1/2004 10:56 AM
    - 1/2007 12:26 PM
    - Custom Data Span
  - Chart Length
    - Week
    - 15 Minute
- Names
  - Level (in)
  - Velocity (fps)
  - Flow (mgd)
  - Main Battery (vdc)
  - Surcharge Level (in)

Chart toolbar icons: Pan, Zoom In, Zoom Out, Copy, Paste, Line, Bar, Pie, Trendline.





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1/2/2004 10:00 AM  
2/2/2007 11:00 AM  
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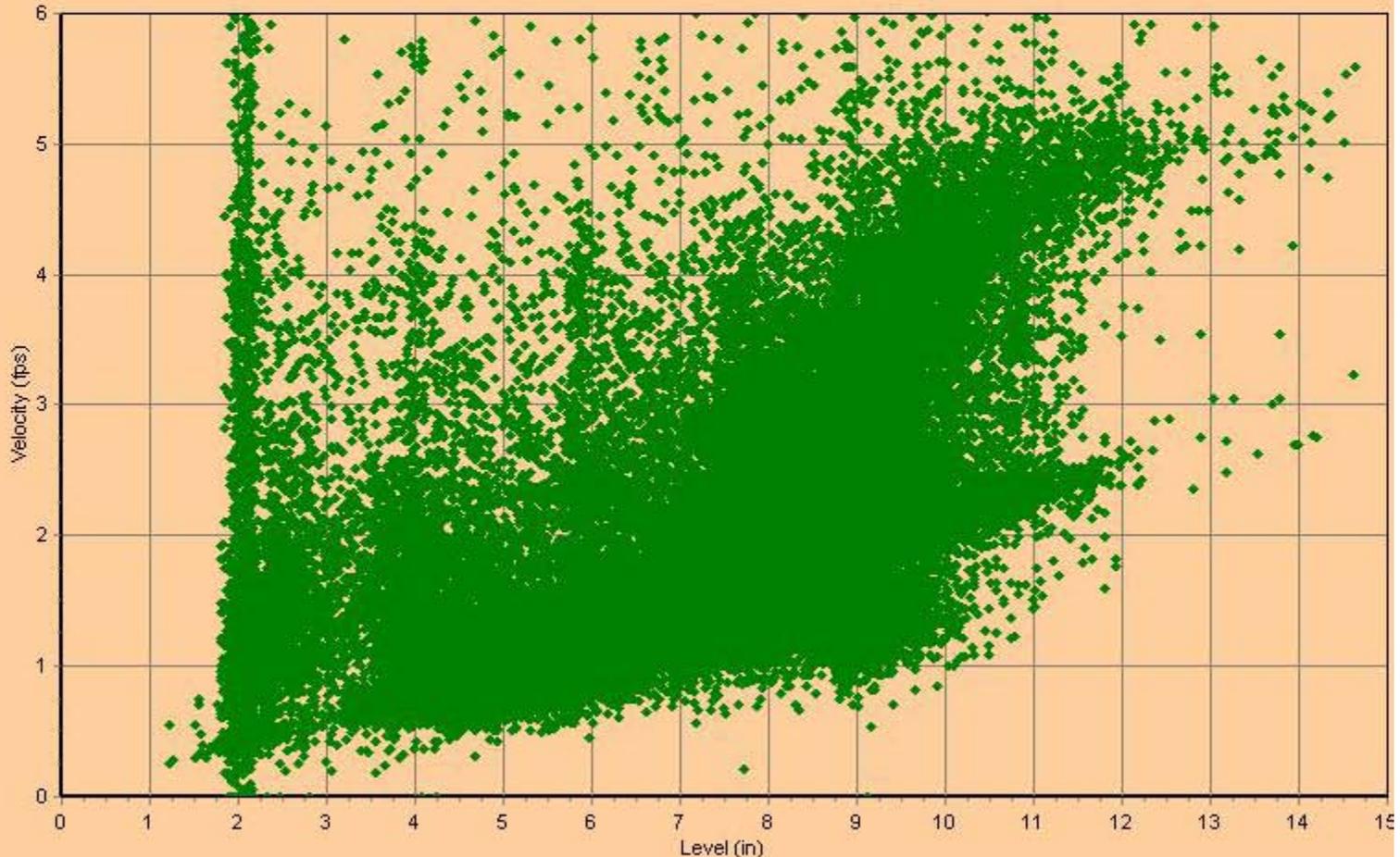
Names

- [Level \(in\)](#)
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- [Flow \(mgd\)](#)
- [Main Battery \(vdc\)](#)
- [Surcharge Level \(in\)](#)



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◆ Level vs Velocity



Main  
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Report Settings

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 5/15/2006 11:05 AM  
 5/22/2006 12:05 PM  
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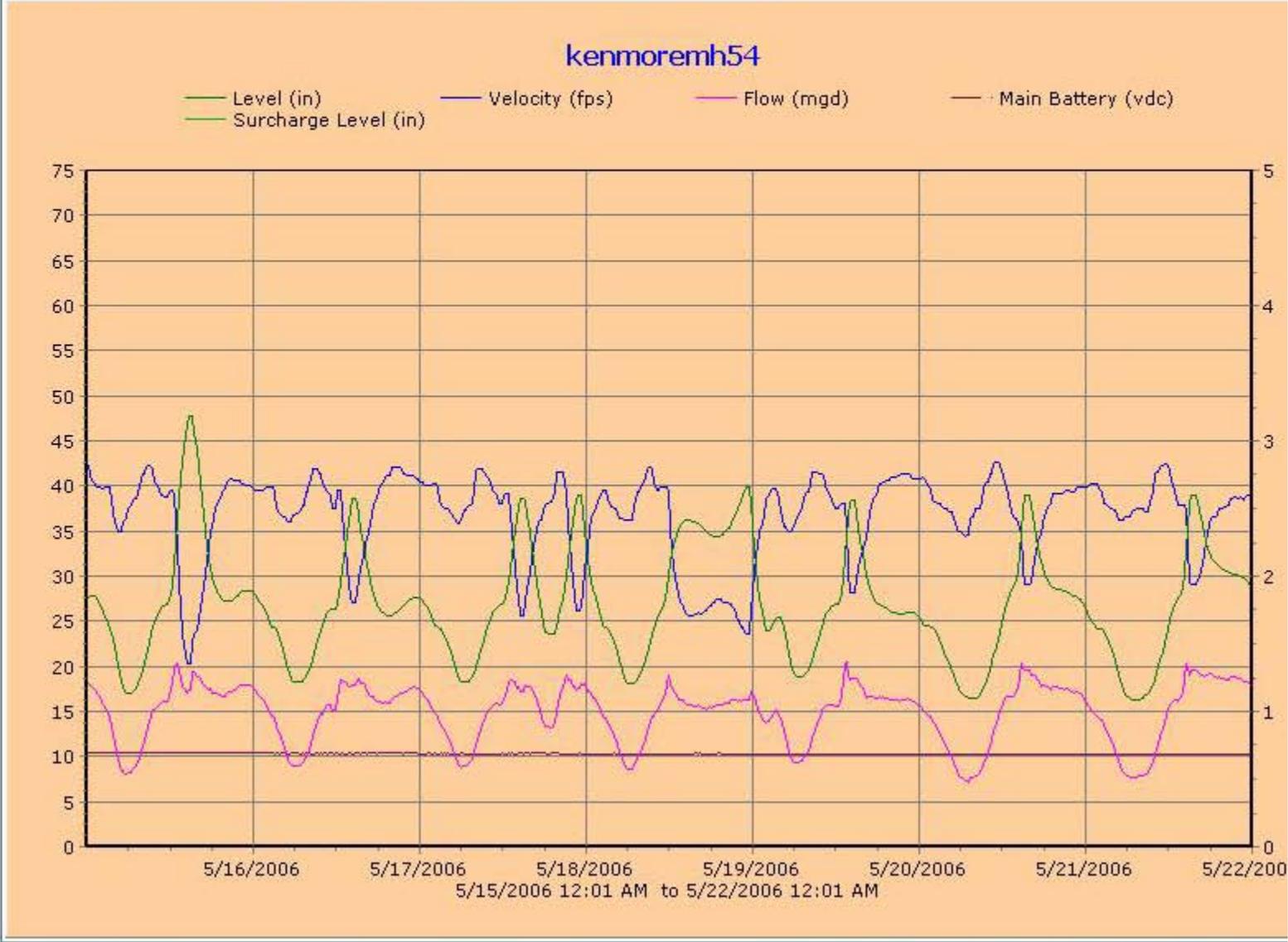
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Items

- Level (in)
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- Main Battery (vdc)
- Surcharge Level (in)

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# Site Visit Log, Rain Events, and Photo Library

- Detailed record of what the crew members did.
- Tools to cross reference.
- May list changes in site setup and multiplier/site coefficient.
- Help explain gaps, pattern changes, and poor quality data.
- Confirm a spike in the data.
- Help identify I/I problems.

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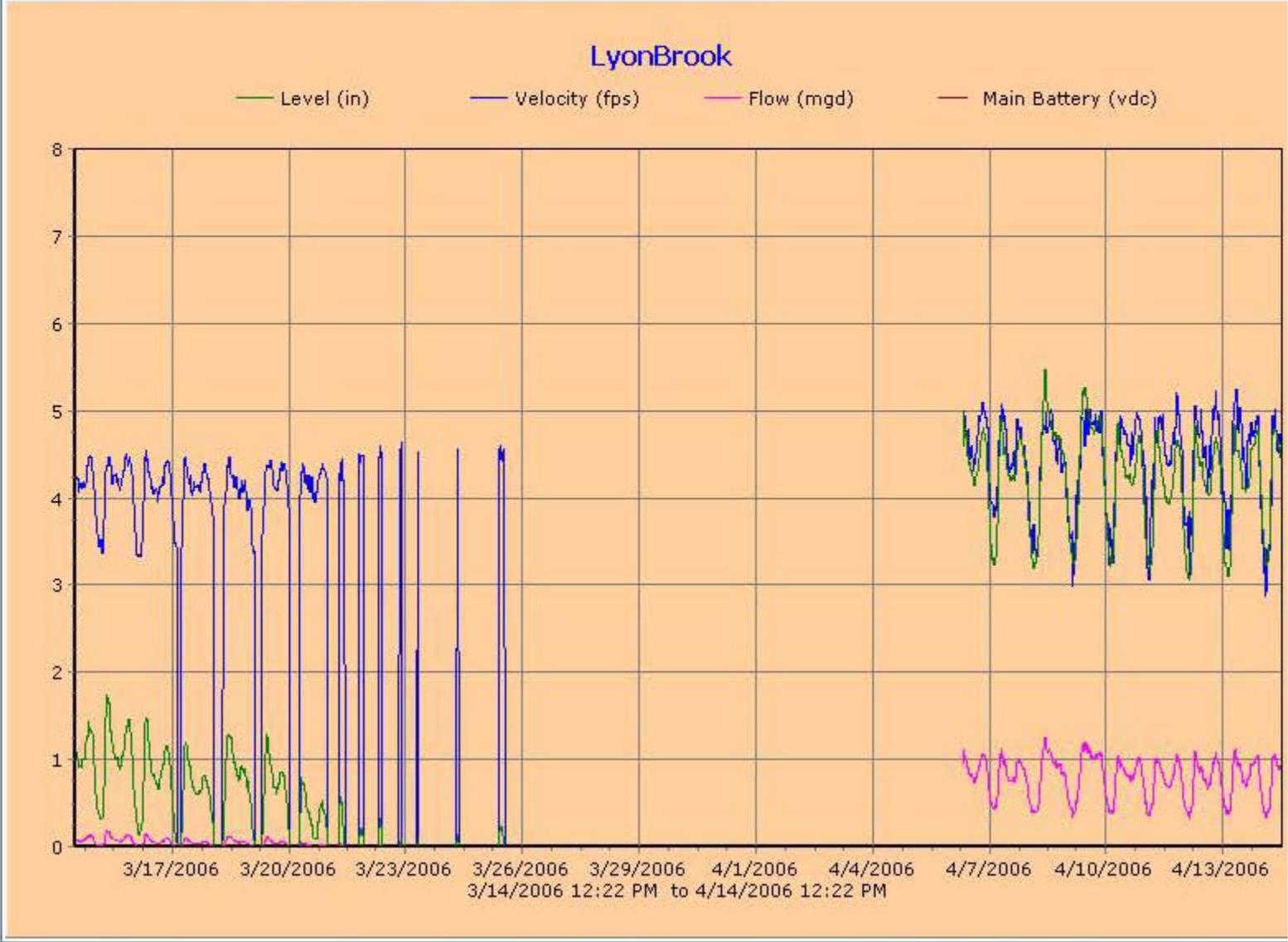
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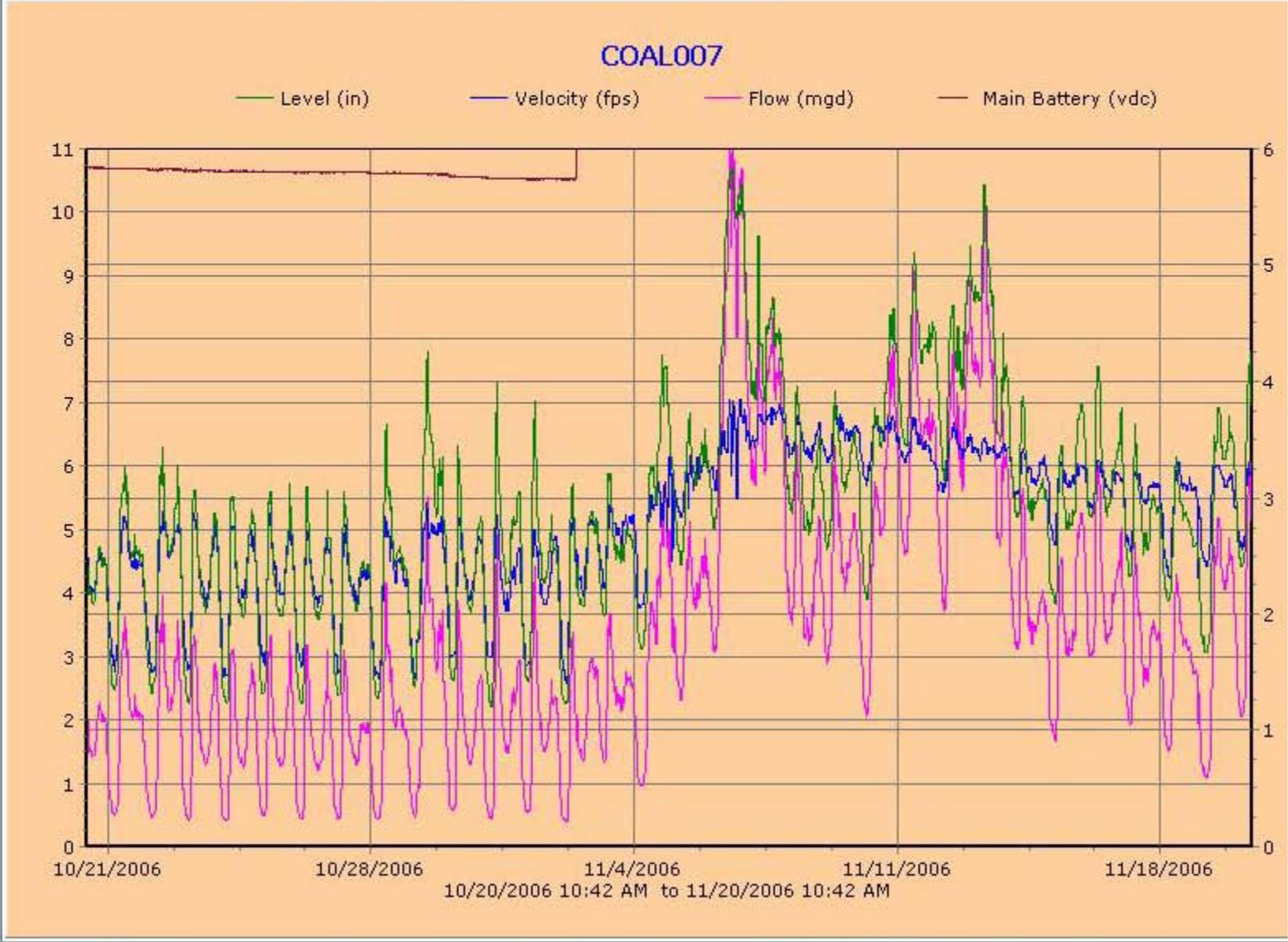




Navigation menu:

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  - Report Data Span: 9/2004 10:30 AM to 2/2007 11:15 AM
  - Custom Data Span
- Chart Length
  - Month
  - Day Average
  - 5 Minute
- Legend
  - Level (in)
  - Velocity (fps)
  - Flow (mgd)
  - Main Battery (vdc)

Chart interaction icons: Pan, Zoom In, Zoom Out, Pan, Legend, Line, Bar, Pie, Scatter





# Setup Changes

- Changes in the site setup can drastically change the data.
- Check for changes in each data file setup before appending to see if it is the same as the original setup of the FloWare project.



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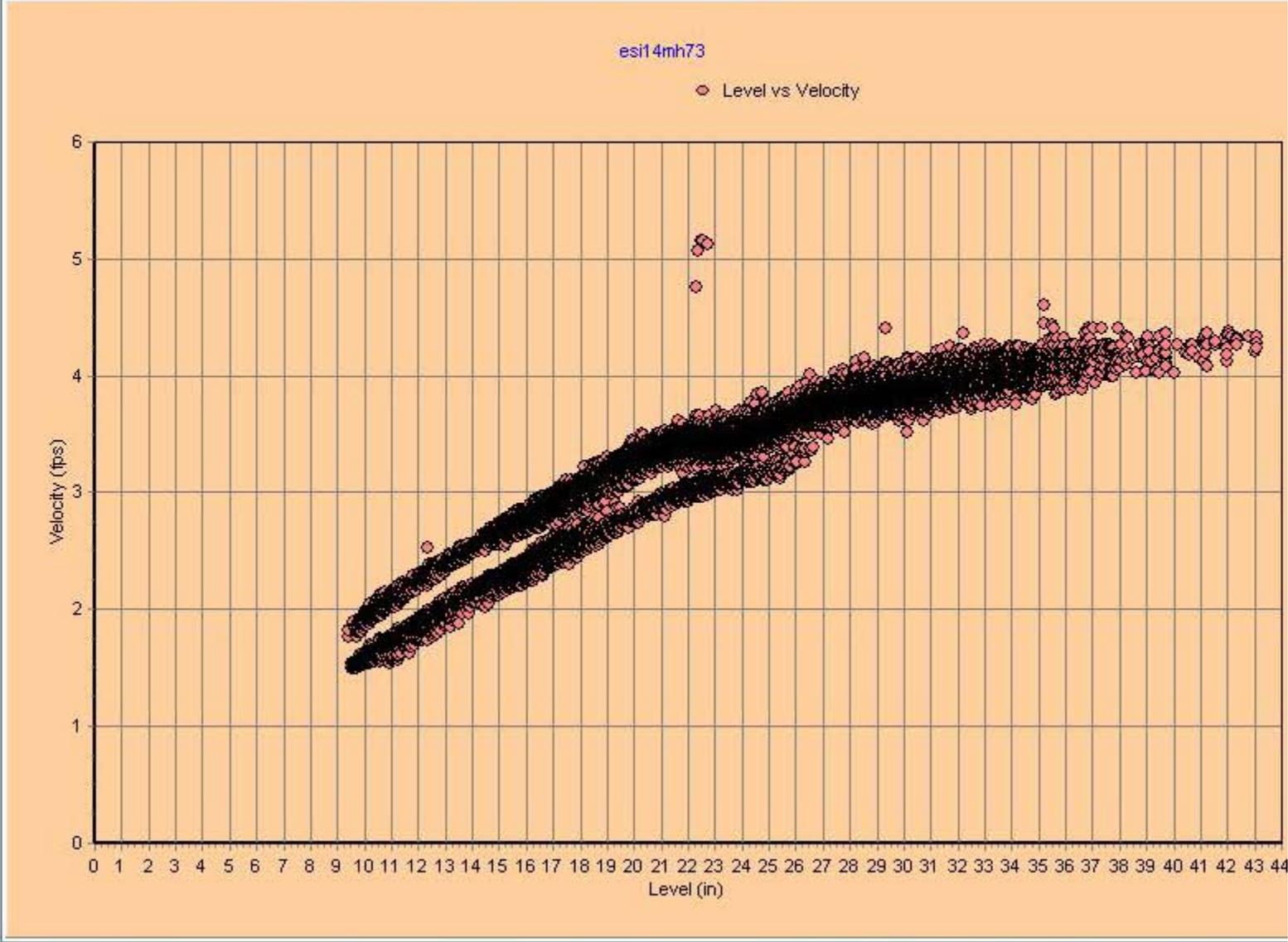
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- [Main Battery \(vdc\)](#)
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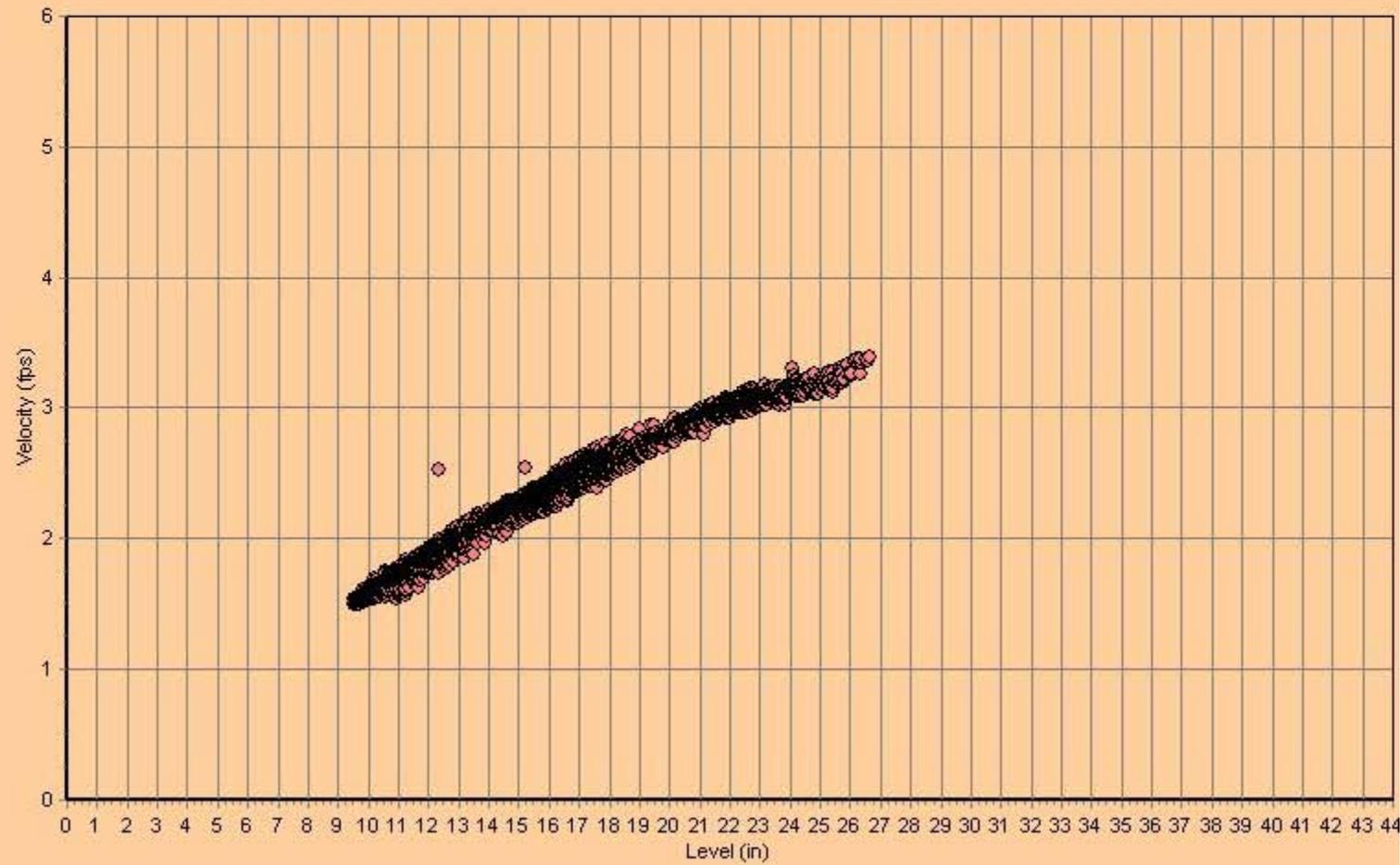
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- [Flow \(mgd\)](#)
- [Main Battery \(vdc\)](#)
- [Surcharge Level \(in\)](#)



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Level vs Velocity





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Report Settings

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7/2006 12:50 PM  
7/2007 9:50 AM

Custom Data Span  
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7/2007 9:50 AM

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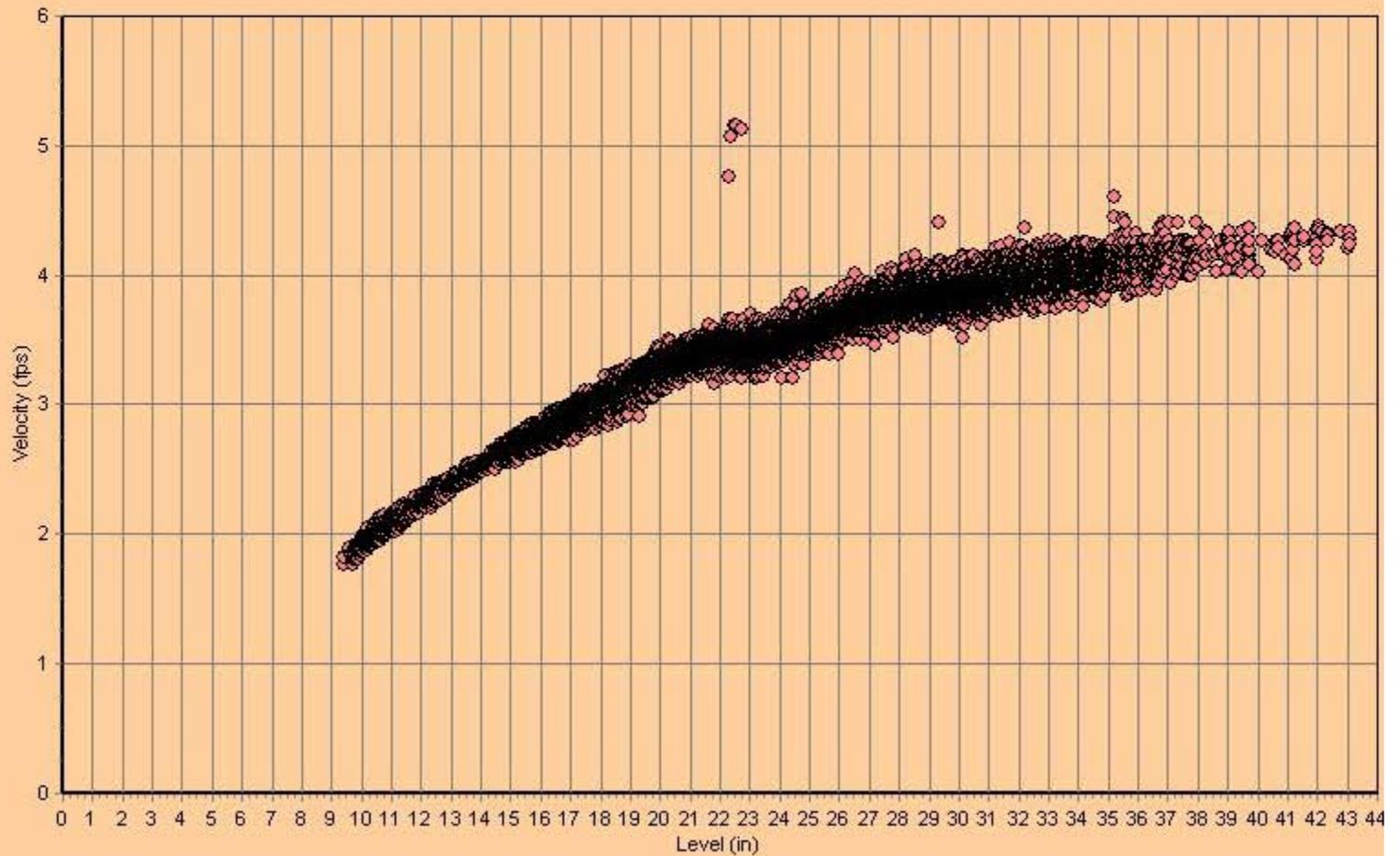
Y-Axis Items

- [Level \(in\)](#)
- [Velocity \(fps\)](#)
- [Flow \(mgd\)](#)
- [Main Battery \(vdc\)](#)
- [Surcharge Level \(in\)](#)



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○ Level vs Velocity





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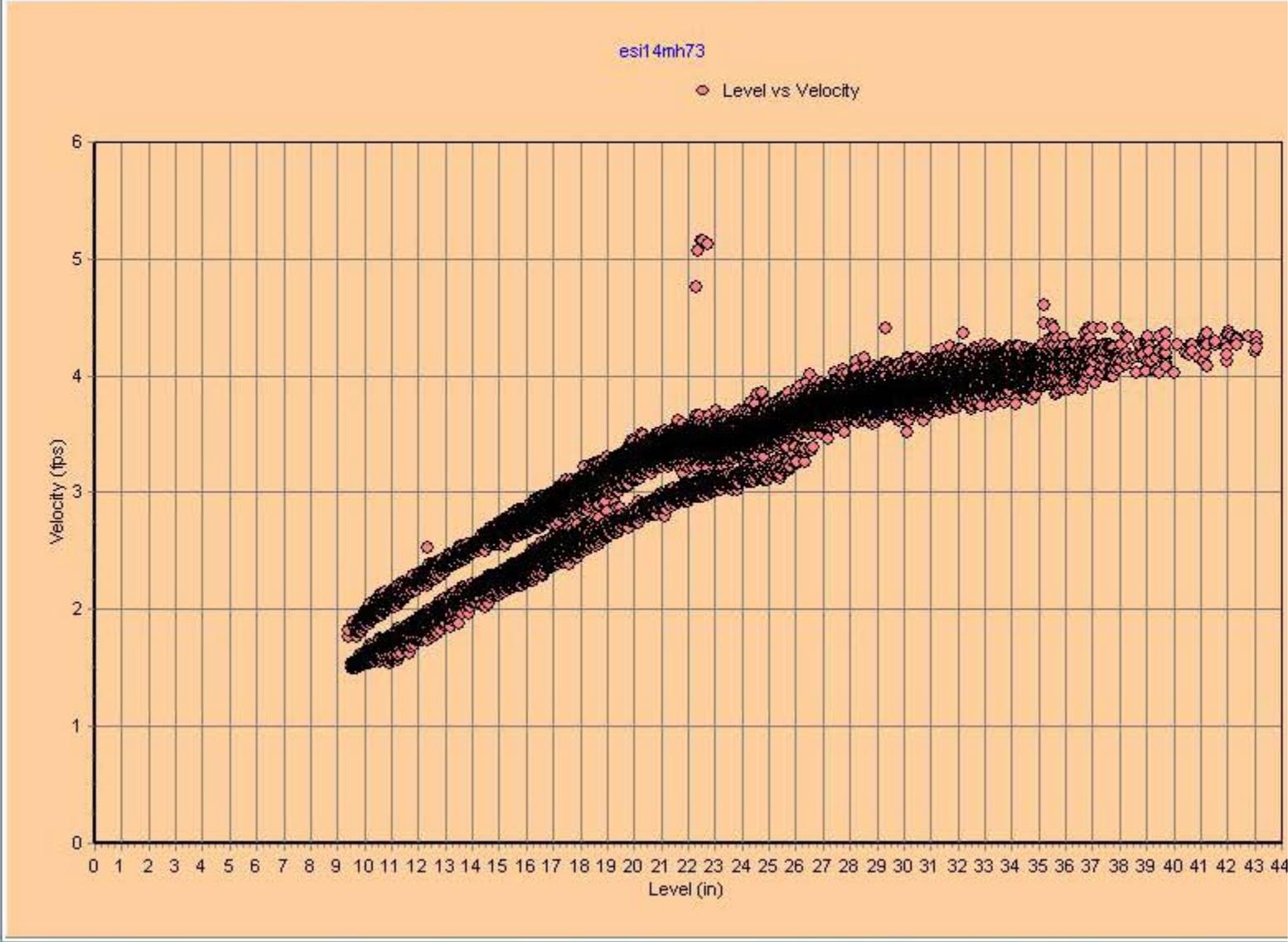
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- [Flow \(mgd\)](#)
- [Main Battery \(vdc\)](#)
- [Surcharge Level \(in\)](#)



# Documentation

- It is important to take notes during detective work. A very important clue may be lost if the data review process is done without attention to detail.

# Shout Outs

- Thank you Sarah White and Lisa Taylor for the warm welcome.
- Special thanks to the flow monitoring team: Abraham Araya, Janice Johnson, Lee Miller, Mike Sands, and John Gemmill. You guys have taught me a lot and have been a blast to work with.
- My cube-mate Alyssa Benson and the rest of the GIS crew for adopting me into their little nucleus. West Wing!
- Much props to the DNRP/WTD Summer Interns of 2007. **It has been a privilege and an honor to be part of the greatest group of interns ever assembled.** Good Luck in all of your future endeavors.